The Center of Gravity Concept:

Informed by the Information Environment.

A Monograph
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14. ABSTRACT - The information sphere is an integral part of the current environment. The center of gravity (CoG) theory currently is matched for conventional, linear, industrial age warfare in the physical domain. The CoG concept is thus not suited to work in the fast changing information environment and needs revision. Nevertheless, the GoG concept is deeply ingrained in United States military doctrine. The CoG concept can be refined to be useful in operational design, by information theory and strategic communication. and the information The current use and interpretation of the CoG concept come in the form of a survey that was conducted during the autumn of 2008 among students and Faculty at the Pre-Command Course and at the School of Advanced Military Studies in Ft Leavenworth. The information environment affects all domains of warfare, with information existing as the energy that holds a system together. Information as a central concept. This method presents a way to expand the CoG beyond just physical aspects. Consequently, the theoretical construct of the doctrinal CoG should be viewed as created by the relationships between the belligerents, as well as the interaction between centripetal and centrifugal forces. The CoG exists in relationship with other CoGs, and the concept should incorporate larger structures and systems to avoid reductionism. Planners also need to identify where the connections and gaps exist in the system as a whole, before they decide whether a CoG exists or is useful. In order to provide a holistic approach to the CoG concept, doctrine should describe the interaction between the moral, cognitive and physical domains. Education and updated doctrine is vital to provide a thorough understanding of the theoretical concepts as a foundation to enable the practitioner to use the center of gravity concept.

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Abstract

THE CENTER OF GRAVITY CONCEPT: INFORMED BY THE INFORMATION ENVIRONMENT by LTC Joakim Karlquist, Combined Arms, Swedish Army, 52 pages.

The information sphere is an integral part of the current environment. The center of gravity (CoG) theory currently is matched for conventional, linear, industrial age warfare in the physical domain. The CoG concept is thus not suited to work in the fast changing information environment and needs revision. Nevertheless, the CGoG concept is deeply ingrained in United States military doctrine. The CoG concept can be refined to be useful in operational design, by including strategic communication theory and the information environment. The current use and interpretation of the CoG concept come in the form of a survey that was conducted during the autumn of 2008 among students and Faculty at the Pre-Command Course and at the School of Advanced Military Studies in Ft Leavenworth. The information environment affects all domains of warfare, with information existing as the energy that holds a system together. This method presents a way to expand the CoG beyond just physical aspects. Consequently, the theoretical construct of the doctrinal CoG should be viewed as created by the relationships between the belligerents, as well as the interaction between centripetal and centrifugal forces. The CoG exists in relationship with other CoGs, and the concept should incorporate larger structures and systems to avoid reductionism. Planners also need to identify where the connections and gaps exist in the system as a whole, before they decide whether a CoG exists or is useful. In order to provide a holistic approach to the CoG concept, doctrine should describe the interaction between the moral, cognitive and physical domains. Education and updated doctrine is vital to provide a thorough understanding of the theoretical concepts as a foundation to enable the practitioner to use the center of gravity concept.

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Section I: Introduction

The shift from a bisected to a trisected global power system and to enormously increased military diversity is already forcing armies throughout the world to rethink their basic doctrines. Thus we are in a period of intellectual ferment among military thinkers.[1]

Alvin and Heidi Toffler in *War and Anti-War*

There is a current debate in the United States military on whether the center of gravity (CoG) concept should be retained in doctrine or relegated purely to the realm of theory..[2] The center of gravity concept is deeply ingrained in United States military doctrine; however, the theory is adapted for conventional, linear, and industrial age warfare. This monograph proposes a way to salvage the center of gravity concept as a central element of operational design.

The operational environment is characterized by complex interrelated organizations and structures that interact and change at a fast pace. Actions and events express messages which are perceived and portrayed differently by different groups of people.[3] The information sphere is an integral part of the environment, as well as an integral part of the actors in the environment. Accordingly, Commanders Appreciation and Campaign Design (CACD) or Design, as a part of operational design, is a way of thinking to generate a systemic and shared understanding of a complex problem and to design a broad approach to manage the problem.[4] Design uses several perspectives to understand and model the different actors in the operational environment,

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[1] Alvin and Heidi Toffler, *War and Anti-War,* (New York: Little, Brown and Company, 1993), 85.

[2] Rudolph M. Janiczek, *A concept at the crossroads: Rethinking the Center of Gravity*, Strategic Studies Institute, U.S. Army War College, (October 2007), 9. http://www.strategicstudiesinstitute.army.mil/pdffiles/pub805.pdf (accessed September 15, 2008)

[3] TRADOC Pamphlet 525-5-500 Commander's Appreciation and Campaign Design Version 1.0,United States Army Training and Doctrine Command, Fort Monroe (January 2008), 4.

[4] Hereafter designated Design or CACD. The introduction of design in doctrine is characterized by debate between several different actors. School of Advanced Military Studies in Fort Leavenworth has received the task to inform the development of an Army Field Manual. There are proponents for the Israeli Systemic Operational Design, a Clausewitzian approach and the translation of design into planning and problem solving. These different standpoints are influencing the debate and work to develop new doctrine. TRADOC Pamphlet 525-5-500 Commander's Appreciation and Campaign Design Version 1.0,United States Army Training and Doctrine Command, Fort Monroe (January 2008), 4.

including elements of operational design.[5] Those perspectives are models which incorporate many aspects on the interrelationships between the important influences in the operational environment. Design can be applied by commanders and staff officers at any echelon confronted by complex adaptive problems. Design considers changes and different interrelationships across the spectrum, and as a result creates a pattern with a purpose.[6] Commanders must first understand a complex environment in order to frame operational problems and then establish an operational framework based upon their understanding of the problem, before using a systematic planning process to solve problems.[7] Indeed, commanders and their staffs need to identify where the connections and gaps exist in the system as a whole before deciding whether a center of gravity exists.

The concept of center of gravity originated from Carl von Clausewitz' definition, "…the hub of all power and movement, on which all depends."[8] The concept has since been interpreted and adopted by contemporary Western militaries as a tool to focus military action. The center of gravity concept is used to analyze and simplify friendly and adversary forces (or systems) in a mechanistic and linear fashion, enabling us to defeat the adversary and defend our own center of gravity.[9] This concept is appealing to the military community because it offers the prospect of using focused military force against the vulnerable aspects of a well defined adversary. The

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5 Joint Chiefs of Staff, *Joint Publication 5-0 Joint Operation Planning*, (26 December 2006), IV-11.

[6] There is an ongoing debate on design, whether to publish a new manual on design before Joint Pub 5-0 Joint Planning is revised. There is also a discussion on how to merge CACD's notion of establishing a shared understanding of the problem, and from the solution a solution will emerge, versus the elements of operational design that describe a solution. Thus, design is a problem focused approach and doctrine is a proponent of solution focused approach.

[7] TRADOC Pamphlet 525-5-500 Commander's Appreciation and Campaign Design Version 1.0, United States Army Training and Doctrine Command, Fort Monroe (January 2008).

[8] Carl von Clausewitz, *On War,* Edited and translated by Michael Howard and Peter Paret, (Princeton: Princeton University Press, 1984), 595.

[9] Joint Chiefs of Staff Joint Publication *3-0 Joint Operations*, (2006, incorporating change 1 February 2008), IV-9--IV-10.

concept is deeply ingrained in doctrine and it is widely used and accepted in the United States military establishment.[10] The key to winning a conflict or setting the conditions to terminate a conflict is to break the adversary's will to fight.[11] The essence of operational design can be considered as to protect one's own center of gravity and attack the enemy center of gravity However, the contemporary operational environment has forced the concept to transform into several centers of gravity for different purposes and at different levels. Several changing or shifting centers of gravities today face the military commander, which in itself is a contradiction to the core of the theory behind the concept which focuses on a single CoG in the battle of the single point. Additionally, the center of gravity concept does not apply if enemy elements not are connected sufficiently.[12] Center of gravity analysis presents a structured military force during a snapshot in time, without fully considering the changing nature of human interaction, as well as the interaction and changing relationships of other agents.[13] The center of gravity concept is thus not suited to work in the fast changing information environment and the concept need constant revision.

Methodology

The argument therefore is that the center of gravity concept is no longer theoretically appropriate to be utilized in operational art and requires a modification to support the contemporary operating environment. This monograph proposes that the required modification is to incorporate strategic communication theory and embrace the information environment.

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[10] The survey this monograph has conducted show that the center of gravity is a useful concept, but that there are several interpretations on how to use it, see Appendix 1 for more details.

[11] Joint Chiefs of Staff Joint Publication *3-0 Joint Operations*, (2006, incorporating change 1 February 2008), IV-12.

[12] Carl von Clausewitz, *On War,* Edited and translated by Michael Howard and Peter Paret, (Princeton: Princeton University Press, 1984), 617; and Joint Chiefs of Staff Joint Publication *3-0 Joint Operations*, (2006, incorporating change 1   February 2008), IV-10.

[13] Tim Bird "UK Effects-Based Planning and Centre of Gravity Analysis: An Increasingly Dysfunctional Relationship", *RUSI Journal*, (April 2008), 48

Strategic communication theory is necessary to refine the concept of CoG because the information sphere is a vital part of the environment, as well as a vital part of the actors in the environment. Also, strategic communication theory resides in the cognitive and moral domain of warfare, together with information theory.[14] But, how can the center of gravity concept be refined to be applicable in operational design, by including strategic communication theory and the information environment in the center of gravity concept?

Qualitative analysis of the center of gravity theory in combination with quantitative analysis from an operating forces survey will serve to answer the research question.[15] The question implies that the center of gravity concept is flawed, and requires both factual and theoretical evidence to validate the premise. No singular theory will be used to describe the center of gravity concept; instead, several theories will be used to describe and synthesize an overall understanding of the concept. The first section of the monograph will investigate the origins and use of the center of gravity concept, describe Design, and discuss how the center of gravity concept can be re-incorporated and applied in Design. The second section will describe the information environment in conjunction with strategic communication theory to set the conditions for a United States army battalion- and brigade- level commander's operating forces survey on the center of gravity (See Appendix 1). The results of this survey intend to quantify the operating force's use of the center of gravity concept and demonstrate the practical relevance of the concept. The qualitative and quantitative analyses are then merged in order to modify the center of gravity concept as an element of operational design.

Clausewitz' *On War,* in combination with articles by military theory authorities such as Dr. Joseph Strange, Dr. James Schneider, and Dr. Antulio Echavarria II, will provide the

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[14] Carl von Clausewitz, *On War,* Edited and translated by Michael Howard and Peter Paret, (Princeton: Princeton University Press, 1984), 183-184.

[15] Stephen van Evera, *The methods for students of Political Science,* (Ithaca: Cornell University Press, 1997), 9, 28.

foundation for the center of gravity concept. This monograph will not describe campaign design beyond the concept described in the TRADOC Pamphlet 525-5-500 *Commander's Appreciation and Campaign Design.* The Design concept is complemented by perspectives from retired General Huba Wass de Czege's and articles by Colonel Stefan Banach the director of School of Advanced Military Studies (SAMS) and Dr. Alex Ryan professor at SAMS. The main theme will be to develop the role of center of gravity in conjunction with existing doctrine. This monograph will not investigate the German *Schwerpunkt* concept or its interpretation and use into a center of gravity concept.[16] Colonel (Ret) William M. Darley's and Dr. Dennis Murphy's articles will provide the United States government's approach to Strategic Communication. Steven R. Corman, Angela Thretaway, and Bud Godall's at the Consortium for Strategic Communication at Arizona State University information theory, together with David Sing Grewal's concept of network power will provide a theoretical foundation on the information aspect. The environment will be described by contemporary influential social thinkers as Samuel P. Huntingdon, Thomas Friedman, the Tofflers, and the British General Sir Rupert Smith.

Section II: Center of Gravity; An Intellectual history

Western militaries have struggled with Carl von Clausewitz' abstract concept of center of gravity (Schwerpunkt in German) since *On War (Vom Kriege* in German*)* was published in 1832.[17] The German Army has used the concept as a focal point for their main effort and has

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[16] The German term Schwerpunkt is distinct from center of gravity in German doctrine. Schwerpunkt is more equivalent to the point of main effort or focal point. The German Armed Forces are struggling with the concept of Schwerpunkt in counterinsurgency and stability operations because of the ambiguous complex multi facetted situation which presents multiple points instead of one clear focal point or direction.

[17] Carl von Clausewitz, On War, Edited and translated by Michael Howard and Peter Paret, (Princeton: Princeton University Press, 1984), 486-87, 595-96.

taken a primarily physical aspect from the concept.[18] On the other hand, the United States military has used the concept since the introduction of the Air-Land battle in the early 1980s and various services and scholars are still struggling over its interpretation and use.[19]

Carl von Clausewitz was a veteran of the Revolutionary and the Napoleonic wars between 1793 and 1815, where the character of war changed significantly and the seeds of modern operational art were planted.[20] He was initially part of the small Prussian professional army that fought the limited wars of the monarch. Clausewitz later became part of the change to the nation's large conscription based reorganized army, which maneuvered across vast distances and fought decisive battles that reshaped the map of Europe.[21] This revolution in warfare made a deep impression upon Western military thought, and the Napoleonic legacy lasted for generations and is still influential today. Clausewitz participated in the wars where he observed the changing character of war and used physical science to create metaphors, such as friction and magnets, to illustrate his ideas. As with most of his contemporaries, Clausewitz was schooled in physical science, such as engineering, mathematics, and mechanics in the military schools. He may, therefore, have been directly influenced by the physicist Paul Erman who taught at the Allgemeine Kriegsschule when Clausewitz was the director of the school.[22]

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18 James J. Schneider, and Lawrence L. Izzo "Clausewitz's Elusive Center of Gravity." Parameters Vol 17 No. 3 (September 1987), 50.

19 Rudolph M. Janiczek, A concept at the crossroads: Rethinking the Center of Gravity, Strategic Studies Institute, U.S. Army War College, (October 2007). http://www.strategicstudiesinstitute.army.mil/pdffiles/pub805.pdf (accessed September 15, 2008)

20 The character of war changes like a chameleon but the nature of war is timeless, as illustrated by Clausewitz paradoxical trinity. Carl von Clausewitz, On War, Edited and translated by Michael Howard and Peter Paret, (Princeton: Princeton University Press, 1984), 89.

21 Carl von Clausewitz, On War, Edited and translated by Michael Howard and Peter Paret, (Princeton: Princeton University Press, 1984), 5.

22 Antulio J. Echevarria II "Clausewitz' Center of Gravity: It's not what we thought", Naval War College Review Vol LVI, No 1 (Winter 2003).

Clausewitz' thesis in Chapter One of Book One is the starting point for the center of gravity concept where he compares war to a duel, or a clash between two living forces.[23] The object of the duel is to enforce one's will upon an opponent. The immediate aim is to "throw the opponent" and render the opponent powerless.[24] The theme of a dynamic struggle between opponents with a will of their own, and the interrelationship between the opponents, continues through *On War*. Most significant, the synthesis in the first chapter is the famous "paradoxical trinity" which is interpreted as one part of the enduring nature of war.[25] The "paradoxical trinity" is the interrelationship between the passion (of the people), "the play of chance and probability" (with the military), and the political rationality (of the government).[26] Accordingly, these themes lead up to the much quoted concept of CoG in Chapter Four of Book Eight:

> What the theorist must say here is this: one must keep the dominant characteristics of both belligerents in mind. Out of these characteristics a certain center of gravity develops, the hub of all power and movement, on which everything depends. That is the point against which all our energies should be directed. [27]

This concept of connected forces is comprehensible from a mechanical perspective, where the entirety of the centripetal and centrifugal forces in a physical object has a point where the center of gravity is. Even an object that moves has a center of gravity, but the specific point may shift if

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[23] Clausewitz was heavily influenced by the philosopher Georg Hegel, who was an influential philosopher during the German Enlightenment. Von Clausewitz used the "Hegelian dialectic' with a thesis or an argument, followed by an anti-thesis, followed by the synthesis or the conclusion of the thesis and anti-thesis in every chapter of On War.

[24] Carl von Clausewitz, *On War,* Edited and translated by Michael Howard and Peter Paret, (Princeton: Princeton University Press), 1984, 75.

[25] Carl von Clausewitz describe the changing character of war as something more than a chameleon, which just changes color. The enduring nature, based on the three tendencies of the people, military and the government, will in its turn change as is suspended between magnets. Friction, uncertainty, danger and moral aspects are also part of the enduring nature of war.

[26] Carl von Clausewitz, *On War,* Edited and translated by Michael Howard and Peter Paret, (Princeton: Princeton University Press, 1984), 89.

[27] Ibid, 595-596.

the object transforms or shape-shifts during its action.[28] An interesting aspect on this is that a curved object, like a boomerang, does not have its center of gravity within the object but in the space between the arms.[29] Furthermore, the different forces or parts have to be interrelated or interconnected with the object to be part of the center of gravity. There will otherwise be a lack of cohesion, which results in two separate objects and therefore two centers of gravity. The application of force to an object will affect and shift the center of gravity, which in its turn will unbalance or strengthen the stability of an object (Figure 1). Nevertheless, physically there will always be a center of gravity for an object. On the other hand, Clausewitz explains that the center of gravity depends on internal factors and external factors, as well as upon the relationship (German Zusammenhang) with the opponent during the struggle, hence his reference to the characteristics of "both belligerents" in the quote above.[30] For these reasons, the friendly and opponent center of gravity may shift and change when the relationship between the adversaries changes during the struggle. The validity of the concept of center of gravity is created by the interaction between the belligerents and changes as they alter their relationship, as the opponents do in Figure 1.

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[28] An object consists of several smaller objects or particles, or may be seen as consisting of several forces; centripetal or centrifugal.

[29] Antulio J. Echevarria II "Clausewitz' Center of Gravity: It's not what we thought", Naval War College Review vol LVI, No 1 ((Winter 2003), 111.

[30] Carl von Clausewitz, *On War,* Edited and translated by Michael Howard and Peter Paret, (Princeton: Princeton University Press, 1984), 617.

Figure 1: CoGs that are interrelated and shifts during the struggle between the opponents.

In fact, von Clausewitz states that "A center of gravity is always found where the mass is concentrated most densely" and describes physical entities, such as armies and capitals, as CoGs.[31] Physical entities like armies as CoGs supports the United States Army War College professor Dale Eikmeier's perception of a center of gravity as a tangible noun, which is able to perform the critical actions needed to achieve an end state.[32] Still, Dr. Christopher Bassford of the United States National War College points out that "the correct identification of any center of gravity would have to be consistent with the character of the situation and appropriate to the political purposes of military operations."[33] The concentration of mass somehow differs with the important notion of non-tangible examples of CoGs, like personalities of leaders, public opinion, or community of interest, as Clausewitz describes later in his book.[34] Additionally, the

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[31] Carl von Clausewitz, *On War,* Edited and translated by Michael Howard and Peter Paret, (Princeton: Princeton University Press, 1984), 485.

[32] Dale C. Eikmeier, "Ends, Ways, Means: A logical method for Center-of-Gravity Analysis", *Military Review September-October 2007,* 63-64.

[33] Christopher Bassford, "Clausewitz and his works", *www.clausewitz.com,* http://www.clausewitz.com/CWZHOME/CWZSUMM/CWORKHOL.htm#OnWar, (Accessed 19 Nov 2008)

[34] Carl von Clausewitz, *On War,* Edited and translated by Michael Howard and Peter Paret, (Princeton: Princeton University Press, 1984), 596.

distinguished naval military history professor Dr Jon Sumida emphasizes "the personalities of leaders and public opinion" as centers of gravity in wars among the people, and as such insusceptible to military force alone.[35]

Dr. Joe Strange, the professor of Strategic Studies at the United States Marine Corps War College, interprets the CoG as "dynamic and powerful physical and moral agents of action or influence."[36] He sees CoGs as dominant and able to strike powerful blows, and he envisions both the obvious physical and the less obvious moral centers of gravity. Dr. Strange suggests furthermore that there are different CoGs at the different levels of war, which contradicts or possibly refines Clausewitz' aspiration for a single CoG.

Dr. Antulio Echevarria II, the Director of Research for the United States Army War College points out the problems with the translation of *Vom Kriege* to *On War*.[37] He posits that the CoG needs to be redefined as a focal point instead of a source of strength and a factor of balance instead of a source of strength. He furthermore stresses the importance of connectivity within a CoG as well as the existence of a powerful centripetal force that tends to hold structures together.[38] Dr. James Schneider, the former professor of military theory at the United States Army School of Advanced Military Studies, agrees that the center of gravity has a "coherent relationship among its parts", as well as a relationship between the friendly and the enemy CoG.[39] On the other hand, Schneider offers conflict as a collision of opposing centers of gravity,

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[35] Jon Tetsuro Sumida, *Decoding Clausewitz: A New Approach to On War,* (Lawrence: University Press of Kansas, 2008), 174.

[36] Joseph L. Strange, and Richard Iron "Center of Gravity: What Clausewitz Really Meant", *Joint Force Quarterly No 3, (*2004), 27.

[37] Center of gravity and 'Schwerpunkt' is but one of many examples where interpretation from German transform the original meaning. Policy or politics translated from the German word 'politik', as well as the discussion on the impact of the decisive battle are a few more important examples.

[38] Antulio J. Echevarria II "Clausewitz' Center of Gravity: It's not what we thought", Naval War College Review Vol LVI, No 1 ((Winter 2003), 115.

[39] James J. Schneider, and Lawrence L. Izzo "Clausewitz's Elusive Center of Gravity." *Parameters Vol 17 No. 3* (September 1987), 56.

forces with momentum colliding with forces of inertia and resistance which suggests independent

friendly and opposing centers of gravity.[40] Furthermore, Schneider is also a strong proponent for

the CoG as the "greatest concentration of combat force."[41] As a result of the divergent theoretical

and academic underpinning to the concept, there is a tension between the interpretations of the

CoG in its role in modern United States military doctrine. The interpretation of the concept has

developed into a struggle between the believers in the theoretical academic approach and the

proponents of the concept as a factual tool in doctrine. Thus, the academics' understanding of the

concept versus the practitioners' application of the concept has been affected by the disparate

views.

Center of Gravity and Modern Military Doctrine

The introduction of the center of gravity concept into United States military doctrine was

introduced as a part of Air/Land Battle doctrine during the 1980s.[42] Since then, different services

have developed different views on the CoG concept. For example, the Air Force used several

CoGs, as in Wardens concept of strategic rings that support a government.[43] The Marine Corps

has used the concept down to squad level, and they have once confused the CoG with a weakness

or vulnerability.[44] Present day Joint Pub 3-0 defines a center of gravity as "The source of power

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[40] James J. Schneider, "Agents of Change: Transforming the Principles of War for the 21st Century", *Army,* (July 2006), 32.

[41] James J. Schneider, and Lawrence L. Izzo "Clausewitz's Elusive Center of Gravity." *Parameters Vol 17 No. 3* (September 1987), 56.

[42] Richard Swain *Filling the Void: The Operational Art and the U.S. Army,* Student issue at SAMS, Ft Leavenworth: School of Advanced Military Studies, 40.

[43] Antulio J Echevarria II. *Clausewitz' Center of Gravity: Changing our warfighting doctrine – again!,* Strategic Studies Institute, U.S. Army War College, (2002 September), 2. http://www.strategicstudiesinstitute.army.mil/ (accessed September 15, 2008).

[44] Joe Strange, *Centers of Gravity and Critical Vulnerabilities: Building on the Clausewitzian Foundation so that we can all speak the same language*, Perspectives on Warfighting Number 4, Quantico: Marine Corps Association, 1996, 2.

that provides moral or physical strength, freedom of action, or will to act."[45] Also, Eikmeier defines the CoG as "…a source of power that creates a force or a critical capability that allows an entity to act or accomplish a task or purpose."[46] According to Dr. Echevarria, the 1995 Joint Pub 3-0 *Joint Operations* condensed the essence of operational art into "being able to mass effects against the enemy's sources of power, or CoGs, to gain a decisive advantage."[47] For these reasons the doctrinal concept of center of gravity may be interpreted as attacking the enemy source of power, while balancing and protecting your own, thereby unbalancing or defeating the enemy and achieving the end state.

The concept has further borrowed from Jomini's concept of Lines of Operation and Decisive Points as ways to defend and attack a CoG.[48] Lines of Operations, through Decisive Points, have been designed to attack the CoG, to unlock the operational end state, and to subsequently affect the strategic level CoG and end state.[49] Strange's concept identifies the capabilities of the CoG and the requirements of those capabilities, which show the interrelations between the centripetal and centrifugal forces that upholds the CoG.[50] Finally, Strange's process identifies deficient parts of the critical requirements that are vulnerable to attack, influence or

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[45]Joint Chiefs of Staff Joint Publication 3-0 Joint Operations, (2006 incorporating change 1February 2008), GL-7.

[46] Dale C Eikmeier, "Center of Gravity analysis", *Military Review July-August 2004,* 2.

[47] Antulio J Echevarria II. *Clausewitz' Center of Gravity: Changing our warfighting doctrine – again!,* Strategic Studies Institute, U.S. Army War College, (2002 September), 2.
http://www.strategicstudiesinstitute.army.mil/ (accessed September 15, 2008).

[48] Antoine Henri Jomini, *The Art of War,* translated by G.H. Mendell and W.P Craighill, (Westport, CT, Greenwood Press), 77.

[49]Tim Bird "UK Effects-Based Planning and Centre of Gravity Analysis: An Increasingly Dysfunctional Relationship", *RUSI Journal*, (April 2008), 48.

[50] Joint Chiefs of Staff, *Joint Publication 5-0 Joint Operation Planning*, (26 December 2006), IV 11;and Joe Strange, "Centers of Gravity and Critical Vulnerabilities: Building on the Clausewitzian Foundation so that we can all speak the same language", *Perspectives on Warfighting Number 4*, (Quantico: Marine Corps Association, 1996), 43.

exploitation.[51] Protecting the friendly critical vulnerabilities and attacking or exploiting the

enemy critical vulnerabilities at decisive points along several lines of operation is an important

part of the modern interpretation of operational art.[52] Notwithstanding the other terms such as

national will or public support, the interpretation offers the idea of a capabilities based definition.

All fundamentals, be it moral factors, leadership, national will, or public opinion tend to trace

back to an opponent's capability to resist.[53] Schneider wrote in 2006 that "this power of resistance

(center of gravity) is essential for military art to flourish at all."[54] The structured use of one

friendly and one enemy CoG enables the precise use of force with a clear focus, to facilitate Sir

Basil Liddell-Hart's indirect approach.[55] The CoG concept allows for a clarity and focus that

enables the planning and initiation of tactical activity, as well as the measurement of success.

According to Dr. Tim Bird at King's Collage in London "It provides for a framework within

which competing demands for resources can be prioritized, and provides a clear narrative to

justify the conduct of the campaign up and down the chain of command.[56] Nonetheless,

[51] Joe Strange, Centers of Gravity and Critical Vulnerabilities: Building on the Clausewitzian Foundation so that we can all speak the same language, Perspectives on Warfighting Number 4, Quantico: Marine Corps Association, 1996, 74-75.

[52] Operational art defined as "The application of creative imagination by commanders and staffs…to design strategies, campaigns, and major operations and organize and employ military forces. Operational Art integrates ends, ways and means across the levels of war" Joint Publication 3-0 Operations, 2006, GL-24.

[53] Antulio J. Echevarria II,. *Clausewitz' Center of Gravity: Changing our Warfighting doctrine – again!,* Strategic Studies Institute, U.S. Army War College, (2002 September). http://www.strategicstudiesinstitute.army.mil/ (accessed September 15, 2008

[54] James J. Schneider, "Agents of Change: Transforming the Principles of War for the 21st Century", *Army,* (July 2006), 32.

[55] Basil Liddell-Hart, *Strategy: The indirect approach*, third revised edition, (London: Faber and Faber, 1954).

[56] Tim Bird "UK Effects-Based Planning and Centre of Gravity Analysis: An Increasingly Dysfunctional Relationship", *RUSI Journal*, (April 2008), 48.

Clausewitz's metaphor has been taken literally as a prescriptive term for the use in modern doctrine quite contrary to the descriptive essence of his work.[57]

The scope of the CoG concept must be broad enough that it allows for complex situations yet serve to focus efforts in a coherent manner. The CoG concept intends to create unity of purpose from the highest to the lowest levels of war. Therefore, the concept intends to create patterns of behavior for the friendly forces and increases understanding of the opposing structures. However the CoG's linear cause and effect function needs to cope with the irregular adaptive nature inherent in any social system. The concept cannot solely rest in the physical domain of warfare, but need to incorporate the moral and cognitive domains as well. Only by incorporating a holistic perspective of the entire enemy system—to include the social system and environment it is nested within—can reductionism be avoided.

Can there be several CoGs, such as military, civic, infrastructure, or information CoGs? Are there different CoGs at different levels or at different phases? A positive answer to those questions contradicts von Clausewitz's aspiration for "a single center of gravity if possible."[58] On the other hand, Clausewitz stressed the importance of relationship (German Zusammenhang) within the CoG, and if that fails one can assume there may be several CoGs. Besides, several centers of gravities may also be one part of a natural cognitive evolution for the concept. The CoG may be the source of our strength to resist and overwhelm an adversary, as well as the physical and moral expression of our creative will, according to Schneider's interpretation.[59] There are four basic causal conditions to be met in the doctrinal center of gravity analysis: a clear

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[57] The phrase Center of Gravity has been used in very general terms in his book to describe 'the main concern', the key issue or the 'focal point'. Carl von Clausewitz, *On War,* Edited and translated by Michael Howard and Peter Paret, (Princeton: Princeton University Press, 1984), 148.

[58] Carl von Clausewitz, *On War,* Edited and translated by Michael Howard and Peter Paret, (Princeton: Princeton University Press), 1984,484 and 596.

[59] James J. Schneider, "Agents of Change: Transforming the Principles of War for the 21st Century", *Army,* (July 2006), 32.

and identified enemy; one distinguished feature which provides the source of power to the enemy; the distinguished feature is susceptible to attack or neutralization; and from where there is a linear causality to achieve the operational end state and to affect the strategic CoG and finally to achieve the strategic end state.[60] These conditions may be a self-fulfilling prophecy, which results in the search for a CoG that is concrete and one dimensional. Consequently, this may result in a loss of focus on the strategic context or purpose.[61] Alternatively, the broader definition of the CoG as the population or national and coalition coherence, contradicts its utility as a lens to focus efforts. Thus, Stephen Bassford concludes that "to seek for an all-purpose strategic prescription in Clausewitz's discussion of the center of gravity will therefore lead to the usual frustration."[62] Also, Brigadier General Huba Wass de Czege, is a proponent for new concepts that suit today's demands.[63] He states that "conceptual aids derived from old, industrial age analogies are not up to the mental gymnastics demanded by a 21st century mission."[64] In fact, the center of gravity has been a disputed but essential concept in operational art for almost thirty years, and the idea of Design is presently going to be used to facilitate the commander and staffs' cognitive operational art.

The Art of Design

The 2008 TRADOC Pamphlet 525-5-500 *Commander's Appreciation and Campaign Design Version 1.0* describes Design as "…a process to create a systemic and shared

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[60] Tim Bird "UK Effects-Based Planning and Centre of Gravity Analysis: An Increasingly Dysfunctional Relationship", *RUSI Journal*, (April 2008), 48.

[61] Ibid, 49.

[62] Christopher Bassford, "Clausewitz and his works", www.clausewitz.com, http://www.clausewitz.com/CWZHOME/CWZSUMM/CWORKHOL.htm#OnWar, (Accessed 19 Nov 2008)

[63] The retired general Wass de Czege was the first director of SAMS and is an influential military theorist. Huba Wass de Czege, "Systemic Operational Design: learning and Adapting in Complex Missions", Military Review (January-February 2009), 2.

[64] Ibid, 2.

understanding of a complex operational problem and to design a broad approach for its solution."[65] Stefan J. Banach at School of Advanced Military Studies defines Design in *Military Review* as "an approach to reasoning and critical thinking that enables a leader to create understanding about a unique situation on that basis, to visualize and describe how to generate change."[66] Thus, Design broadens operational art both as a way of thinking and a way for action. Design uses several perspectives to understand and model the different actors in the operational environment. Those perspectives are models which incorporate many aspects on and interrelationships between the important influences in the operational environment. Design is an imaginative, heuristic, and iterative methodology for designing operations in complex operational environments. The methodology is developed by the United States military to grapple with ill-structured, complex adaptive problems through developing a shared understanding of ill-structured problems and then creating broad problem solving approaches on the basis of understanding.[67] Design is also used through preparation and execution in order to provide a foundation to adapt the forces to a changing environment or situation.[68]

Design also incorporates important features of the traditional mechanistic planning processes as the Military Decision Making Process and Joint Operational Planning Procedures, with features from Effect Based Approaches to Operations, as well as important influences from the Israeli Systemic Operational Design.[69] There is an ongoing debate about design: how or if to incorporate design in planning doctrine, how to use it to facilitate problem solving, and if design

[65] TRADOC Pamphlet 525-5-500 *Commander's Appreciation and Campaign Design* Version 1.0 United States Army Training and Doctrine Command, Fort Monroe (January 2008), 4-5.

[66] Stefan J. Banach, "Educating by Design: Preparing Leaders for a Complex world," *Military Review* (March-April 2009), 96.

[67] Pamphlet 525-5-500 *Commander's Appreciation and Campaign Design* Version 1.0. United States Army Training and Doctrine Command, Fort Monroe (January 2008)

[68] Stefan Banach and Alex Ryan, "The Art of Design: A Design Methodology", *Military Review* (March-April 2009), 106.

[69] Ketti Davison, "From tactical planning to Operational Design", *Military Review,* (September-October 2008), 34.

is too theoretical to be used by the practitioner. Design promotes a holistic understanding of interrelated systems; it frames evolving and adaptive problems and creates patterns with a purpose through discourse. The product is "a broad approach to problem solving" or a Design, from which plans and orders can be produced.[70] However, Design is not a planning process in itself, but complements traditional planning processes and is an integral part of operational campaign development.[71] Design is a way to broaden the issue of operational art where the elements of operational design are an integral important part. Design is also an iterative process for problem setting and learning, as opposed to planning that traditionally focuses on problem solving.[72]

An important aspect of Design is the holistic approach to the environment, which means that it uses a systemic approach to frame problems instead of a systematic approach.[73] The systemic approach is especially suited for understanding the complex systems that influence the operational environment. The systems are open systems that consist of many interrelated parts and continuously adapt to and influences changes in the environment.[74] Actors in the environment are complex adaptive system which includes humans that may form social patterns, with individual or collective purposes, that change or evolve over time as a result of interaction with

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[70] TRADOC Pamphlet 525-5-500 *Commander's Appreciation and Campaign Design* Version 1.0, United States Army Training and Doctrine Command, Fort Monroe (January 2008), 13.

[71] Joint Chiefs of Staff Joint Publication 3-0 *Joint Operations*, (2006 incorporating change 1February 2008), IV-3.

[72] Stefan Banach and Alex Ryan, "The Art of Design: A Design Methodology", *Military Review* (March-April 2009), 106.

[73] A systematic approach uses a mechanistic process oriented approach that depends upon a closed rigid system to work, versus a systemic approach that uses a holistic perspective to understand social and open adaptive systems that has a natural tendency to transform. (*Pam 525-5-500, 42*)

[74] A system that consists of parts that actively seek to adapt, the parts have integral strategies to further their interest. The parts of the system acts in interdependence upon each other and upon the larger context. Robert Axelrod and Michael D. Cohen, *Harnessing Complexity: Organizational Implications of a Scientific Frontier*, New York: Basic Books, 2000.

other agents.[75] There is consequently an inherent difficulty in framing a problem or system during a *snapshot* in time or situation. Design is an iterative process that describes interrelated complex adaptive systems, in relation to each other and in relation to the aims of the different actors. Design is used through planning, preparation, execution, and assessment, to provide a basis for adaptive behavior or adaptive action.[76] It uses a combination of analysis, actions, and discourse with all available actors to frame the problem and create a hypothesis or theory of action as a reference for planning and action.[77] For these reasons, Design needs to include the elements of operational design of which the center of gravity concept is one part.

CoG in Design

In the language of Design, friendly actions are intended to achieve objectives and thereby change an undesirable situation into a desirable or acceptable situation.[78] To affect and shift an enemy center of gravity within the system may therefore be a way to change the present condition of a system to a desired state. However, Design presumes that there is no one center of gravity, but rather that there are components or constituencies of a problem or structure that we want to influence.[79] This is based upon the systemic approach to the problem, the existence of several interrelated changing factors or agents that comprise the system or systems which the force intends to influence into a desired state. These factors or agents have a conditional action pattern

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[75] Robert Axelrod and Michael D. Cohen, *Harnessing Complexity: Organizational Implications of a Scientific Frontier*, (New York: Basic Books, 2000), 7, 21.

[76] Stefan Banach and Alex Ryan, "The Art of Design: A Design Methodology", Military Review (March-April 2009), 113.

[77]"The Art of Design is a theory and practice of iterative learning and action that develops and uses critical thinking skills to understand and manage complex problems across the security environment" TRADOC Pamphlet 525-5-500 Commander's Appreciation and Campaign Design Version 1.0, United States Army Training and Doctrine Command, Fort Monroe (January 2008), 39; and SAMS "Art of design: Student text 1.0", 3.

[78] TRADOC Pamphlet 525-5-500 Commander's Appreciation and Campaign Design Version 1.0,United States Army Training and Doctrine Command, Fort Monroe (January 2008), 27-28.

[79] Ibid, 28.

or strategy of their own which interacts causing complex interrelationships and a co-evolutionary process.[80] Accordingly, the system may be seen as a cloud or a swarm with minimal or no centralized control, that relies upon the distributed learning process of interaction and adaption to new situations.[81] The French philosopher Michel Foucault argues that power cannot be generated by one singular source, but "…is everywhere, not because it embraces everything, but because it comes from everywhere."[82] The idea of the absence of a sole source contradicts the center of gravity concept's focus on a single point where centripetal or centrifugal forces converge to attain the present state of the system.

Still, Design attempts to make the system understandable and manageable by retaining capabilities and requirements (i.e., critical factors) of the constituencies and components in a system.[83] The method to exploit or influence parts of a system, through vulnerabilities in the requirements for the capabilities of components of a system is an extension of Strange's concept.[84] There is also a corresponding theory to influence complex systems through leverage points or strange attractors.[85] Both approaches underscore the relationships between several features contrary to the CoG concept as a central vital point in the system. Design embraces a holistic perspective on complex adaptive systems in the operational environment. No clear cut

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[80] Robert Axelrod, and Michael D. Cohen, Harnessing *Complexity: Organizational Implications of a Scientific Frontier*, (New York: Basic Books, 2000), 8, 153.

[81] Eyal Weizman, "Walking through walls: Soldiers as Architects in the Israeli-Palestinian conflict", *Radical Philosophy,* (March/April 2005), 12-13.

[82] Gillez Deleuze develops this concept further by:"Power is not heterogeneous but can be defined only through the particular points through which it passes." Michel Foucault, *The history of sexuality,* Translated by Robert Hurley, (New York; Vintage Books, 1980), 93.

[83] TRADOC Pamphlet 525-5-500 *Commander's Appreciation and Campaign Design* Version 1.0, United States Army training and Doctrine Command, Fort Monroe (January 2008), 28.

[84] Joe Strange, Centers of Gravity and Critical Vulnerabilities: Building on the Clausewitzian Foundation so that we can all speak the same language, *Perspectives on Warfighting Number 4*, Quantico: Marine Corps Association, 1996, 43.

[85] These are places within a complex system where a small shift in one thing can produce great changes in everything. Donella H. Meadows, *Leverage Points: Places to intervene in a system,* The Sustainable Institute, Hartland (1999).

end state exists, but there are instead changing acceptable conditions within a zone of tolerance that continues to change with continued interaction with the system over time. Therefore, Design intends to avoid reductionism that encourages a narrow and military focused one dimensional view on the environment. It also avoids simple causal and sequential, as well as segmented and linear understandings typical of military activity.[86] Hence, the present center of gravity concept is flawed and needs to be revised to be used during operational design. Indeed, the center of gravity concept is not an academic, abstract concept, but a tool for actual planning and execution, and it is an integral part of ongoing operations in the current operating environment.

Section III: Center of Gravity; Still relevant?

The Operating Information Environment

The types of wars have not changed from the agrarian age. The different sorts of wars are still equivalent to what they were centuries ago. Conventional large scale warfare has never been particularly common, and purely conventional warfare between states has also been a rarity.[87] The vast majority of conflicts have been signified by limited low intensity warfare between non-state actors in combination with conventional warfare. Zhivan Alach at the Strategic Studies Institute at the United States War College explains that, "The world wars are named such because they were anomalies, not because they were usual. Land forces have also been the decisive arm for as long as war has occurred; most naval battles of great importance have been linked to land campaigns, and air forces are not even a century old."[88] Indeed, warfare has always been

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[86] Tim Bird "UK Effects-Based Planning and Centre of Gravity Analysis: An Increasingly Dysfunctional Relationship", *RUSI Journal*, (April 2008), 48.

[87] Zhivan Alach, *Slowing Military Change*, Strategic Studies Institute, War Collage, http://www.strategicstudiesinstitute.army.mil/pubs/display.cfm?pubID=878 (Accessed 17 Nov 2008)

[88] Zhivan Alach, *Slowing Military Change*, Strategic Studies Institute, War Collage, http://www.strategicstudiesinstitute.army.mil/pubs/display.cfm?pubID=878 (Accessed 17 Nov 2008)

conducted in the physical, moral and cognitive domain simultaneously as part of the enduring nature of warfare.[89] Nevertheless, one important aspect of the operating environment has changed during the last twenty years: globalization.

The environment is characterized by increasing interconnectedness and interdependence among the actors and non-actors in current societies.[90] The political scientist Thomas Friedman, among many others, acknowledged the phenomenon as *globalization*. Globalization continually changes the nature of relations between nation-states, persons, organizations, and systems. The phenomenon shapes interactions, behaviors, and strategy, and places almost everything and everyone in a global context. Friedman described globalization as "the integration of markets, finance, technology, and telecommunications in a way that is enabling each of us to reach around the world faster, deeper, and cheaper than ever before. And at the same time, is enabling the world to reach into each of us farther, faster, deeper and cheaper than ever before."[91] The researcher at Harvard David Sing Grewal put a social focus on globalization by defining it as "the intensification of worldwide social relations which link distant localities in such a way that local happenings are shaped by events occurring many miles away and vice versa."[92] This indicates a dialectical process where local transformations, as well as the extension of social relations across time and space, are parts of the phenomena. Furthermore, Alvin and Heidi Toffler stated that globalization will increase resulting in a significant increase in interdependence between

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[89] The moral domain is mainly explained by Carl von Clausewitz, *On War,* Edited and translated by Michael Howard and Peter Paret, (Princeton: Princeton University Press, 1984),184-85, the physical domain is explained in James J. Schneider, "The Theory of the Empty Battlefield," *Journal of the Royal United Services Institute for Defense* Studies (Vol 32 No.3) Sep 1987 and the cognitive domain of warfare is explicitly explained by Martin van Creveld, *Command in War*, Cambridge, MA Harvard University Press, 1988, 1-16.

[90] Societies include military formations, non-profit organizations, central and local governments, businesses, as well as various social networks as tribes, clans, and internet communities and fraternities etcetera.

[91] Thomas Friedman, *The Lexus and the Olive Tree*, (New York: Farrar, Straus and Giroux, 1999).

[92] David Singh Greval, *Network Power: The Social Dynamics of Globalization,*(New Haven and London: Yale University Press, 2008), 19.

international and local actors pursuing the generation of wealth.[93] The interdependence will not be limited to economic necessities alone, and will include political, social, informational, and military necessities as well. Therefore, Alvin Toffler characterizes the post-industrialist "Third Wave" civilization as an information society. He writes "for Third Wave civilization, the most basic raw material of all-- and one that can never be exhausted--is information"[94] The information or knowledge may, according to the Tofflers, "be the central resource of destructivity, just as it is the central resource of productivity."[95]

The retired British General Sir Rupert Smith coined the term: "War amongst the people" in his book *The Utility of Force* in 2007, where he explains a current phenomenon in post-industrialist conflicts.

> War amongst the people is different: it is the reality in which the people in the streets, houses and fields – all the people anywhere-are the battlefield. Military engagements can take place everywhere: in the presence of civilians, against civilians, in defence of civilians. Civilians are targets, objectives to be won, as much as an opposing force.[96]

War amongst the people may not be new, but the concept operationalizes important aspects of von Clausewitz' paradoxical trinity in current conflicts. It furthermore accentuates the importance of 'the intangible values' that the Tofflers describe in *War and Anti-War*.[97] The ideas, principles, and moral aspects may be the centripetal force that provides direction and patterns with meaning to distributed and interconnected societies. The centripetal force certainly exists in a nation-state, but it is even more important in a non-state entity. Ideology is the fuel that drives the

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[93] Alvin and Heidi Toffler, *War and Anti-War,* (New York: Little, Brown and Company, 1993).

[94] Toffler describe the agrarian civilization as the first wave, and the industrialized civilization as the second wave that has spread through the world and influenced the different societies. Alvin Toffler, *The Third Wave,* (New York: Bantam Books,1980), 351.

[95] Alvin and Heidi Toffler, *War and Anti-War,*(New York: Little, Brown and Company, 1993), 71.

[96] Rupert Smith, *The Utility of Force,* (New York: Alfred A. Knopf, 2005), 6.

[97] Toffler, Alvin and Heidi, *War and Anti-War,* (New York: Little, Brown and Company, 1993), 71.

decentralized organization, which is especially true for insurgents and terrorists.[98] In contrast, democratic armies cannot win wars without popular support, especially not without a political consensus behind them. However, the Tofflers point out that crisis can now arise faster than consensus can form.[99] Knowledge and information is distributed and available for ordinary people at the same time as the decision-makers receive the information thereby creating a real-time decision-making and consensus-building environment.

The daily struggle to influence people's ideas or their perception of the truth is waged in myriad mediums. The span from word of mouth to technical information media is wide, but its' entirety is important for businesses, governments, political and religious organizations, as well as for military forces. Sir Rupert Smith explains that the media is a useful element in modern conflicts "for attaining the political objective of winning the will of the people. It has also become the medium that connects the people, government, and the army: the three sides of the Clausewitzian triangle."[100] Still, the media in itself is a transmitter of information and mainly measures success by the number of recipients or consumers. Media can therefore be considered as an element to be used and abused by all sides. Every player in the globalized society is competing for people's attention and their trust, to influence each others, salesmen and buyers, political adversaries, incumbents, and insurgents, as well as opposing nation- state military formations in open conflict with each other. As a result, the information environment as part of the moral and cognitive domain needs to be incorporated in the center of gravity concept.[101] Traditionally, the

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[98] Ideology is most often associated with a political character, but can also be of economic character. SPIN – segmented, polycentric, ideologically integrated networks. Oori Brafman and Rod A Beckstrom, *The Starfish and the Spider: The Unstoppable Power of Leaderless Organizations,(*. New York: Portfolio, 2006)

[99] Toffler, Alvin and Heidi, War and Anti-War, (New York: Little, Brown and Company, 1993), 11.

[100] Rupert Smith, The Utility of Force, (New York: Alfred A. Knopf, 2005), 288.

[101] The moral domain covers everything that is created by intellectual and psychological qualities and influences, where information is created, manipulated, and shared. The cognitive domain; where

way to influence has been through propaganda, information, advertising, or information

operations. Strategic communication is the most recent idea which builds upon existing theories

and applications.

Strategic Communication

Strategic communication is a holistic concept to promote ideas, doctrines, or practices to

further one's own cause or to damage an opposing one. It is a whole of government effort that

incorporates dialogue, actions, and messages aimed at influencing the opinions or behavior of

large numbers of people.[102] Richard Halloran describes the intended effects on the different target

audiences:

> Strategic Communication is a way of persuading other people to accept one's ideas,
> policies, or courses of action. Strategic Communication means persuading allies and
> friends to stay with you. It means persuading neutrals to come over to your side or at least
> stay neutral. In the best of worlds it means, persuading adversaries that you have the
> power and the will to prevail over them. Vitally important, strategic communication
> means persuading the nation's citizens to support the policies of their leaders so that a
> national will is forged to accomplish national objectives. In this context, strategic
> communication is an essential element of national leadership.[103]

Accordingly strategic communication is both a theory and a way for the leadership to influence

important audiences. The concept of strategic communication is difficult to understand, especially

with an ambiguous United States government doctrinal definition. However, remembering that

strategic communication is a way to achieve cognitive information effects using available means

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perceptions, awareness, beliefs, and values reside. In addition, decisions are made as the result of
sensemaking. The physical domain concern environments, actions, forces and conditions conducted in the
material world of warfare.

[102] "Focused US government efforts to understand and engage key audiences to create, strengthen,
or preserve conditions favorable for the advancement of US government interests, policies, and objectives
through the use of coordinated programs, themes, messages and products synchronized with the actions of
all instruments of national power." Department of Defense, Joint Publication 1-02 *Dictionary of Military
and Associated Terms*, 511.

[103] Richard Halloran, "Strategic Communication", *Parameters* (Autumn 2007), 4-14.

or connecting actions to messages may simplify the concept.[104] The United States military

doctrine promotes the coordinating effort without giving any specifics on the mechanisms that

synchronize the efforts of the whole government. Information operations, public affairs, and

defense support to public diplomacy are, according to doctrine, the United States military's

contribution to strategic communication.[105] Doctrine seems to emphasize control and

synchronization of information, messages, dialogue, and action to achieve effects. On the other

hand, the United States Army is conducting strategic communication in a more decentralized

fashion down to individuals conducting outreach projects, media interviews, or blogs. Corman,

Thretaway, and Goodall, from the University of Arizona based Consortium for Strategic

Communication, have a theory that emphasizes decentralization and embraces complexity. Their

theory supports the United States Army's current distributed concept of strategic

communication.[106] They state that traditional linear models of communication are outdated and

should be replaced with a 21st century view of communications as interpretation and attribution of

actions in an uncertain environment.[107] This traditional message influence model presents a linear

approach that uses radio communication as an analogy (See Figure 2). The process of influencing

starts with an information source which formulates a message, followed by a transmitter that send

the message to the receiver, and finally to the target audience. The different experiences of the

sender and receiver may complicate the interpretation of the meaning of the message which

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[104] Truth based on evidence is supposed to be an important part of Strategic communication. Dennis M. Murphy "The Trouble with Strategic Communications", *IO Sphere vol 2,* (January 2008). http;//www.carlisle.army.mil/usacsl/papers.asp, (accessed 14 September).

[105] US Joint Forces Command Joint Warfighting Center 'Commander's Handbook for Strategic Communication', 1 September 2008.

[106] Steven R. Corman, Angela Thretaway and Bud Goodall, A 21st Century Model in the Global War of Ideas, Consortium for Strategic Communication, Arizona State University (2007).

[107] Referring to Berlo's and, Shannon and Weaver's traditional linear models of communication, which is being used as a basis to understand communication? Steven R. Corman, Angela Thretaway and Bud Goodall, A 21st Century Model in the Global War of Ideas, Consortium for Strategic Communication, Arizona State University (2007), 3-4.

contributes to the disturbance. This theory does include a certain degree of uncertainty by including disturbance between the transmitter and the target audience. The uncertainty is mitigated by repetition, by communicator skills, and with clear and consistent messages.[108]
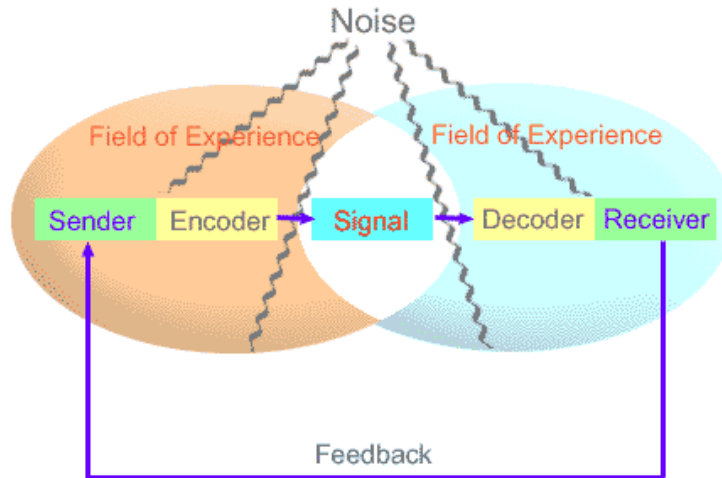
One of the problems with sending the right messages is the difficulty in translating the meaning from the information source to the target audience. Sir Rupert Smith explains this phenomenon of discord between the message and the interpretation by underlining the importance of physical action.[109]

The connection between decentralized acts and messages has now created a new loop, since much of the audience and even segments of the media realize there is a dissonance between what is being shown and experienced and what is explained-- the former clearly being other forms of

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[108] Steven R. Corman, Angela Thretaway and Bud Goodall, A 21st Century Model in the Global War of Ideas, Consortium for Strategic Communication, Arizona State University (2007), 6-7.

[109] Rupert Smith, *The Utility of Force,* (New York: Alfred A. Knopf, 2005), 280.

war, the latter being a desperate attempt to use the framework of interstate war to interpret war amongst the people.[110]

The relationships between action and messages demonstrates the difficulty for traditional information theory, thus the centralized linear way of communication is not effective today. Consequently, the Corman, Thretaway, and Goodall model of *pragmatic complexity* accepts that the transmitters and target audience are locked in simultaneous mutual interdependence in an environment with instant access to information.[111] The interdependence of human dispatchers and recipients within the flow of messages or information makes the theory useful as a starting point for strategic communication.

The theory of *pragmatic complexity* "deemphasizes control and replaces repetition of messages with experimental variation, considers moves that will disrupt the existing system, and makes contingency plans for failure."[112] The de-emphasis on control suggests that the more we try to control effects of communication the less likely we are to succeed. Another factor is the power of networks which may be influenced through common standards.[113] A standard defines the particular way in which a group of people is interconnected within a network. It is the shared norm or practice that enables network members to gain access to one another, facilitating their cooperation.[114] Standards influence the flow of information as a conceptual frame that is a shared set of ideals on causality, knowledge, and expectations at the heart of a complex human system

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[110] Rupert Smith, *The Utility of Force,* (New York: Alfred A. Knopf, 2005), 290.

[111] Steven R. Corman, Angela Threaway and Bud Goodall, A 21st Century Model in the Global War of Ideas, Consortium for Strategic Communication, Arizona State University (2007).

[112] Steven R. Corman, Angela Threaway and Bud Goodall, A 21st Century Model in the Global War of Ideas, Consortium for Strategic Communication, Arizona State University (2007).

[113] A network is an interconnected group of people linked to one another in a way that makes them capable of beneficial cooperation, which can take various forms, including action and the exchange of goods and ideas.

[114] David Singh Greval, *Network Power: The Social Dynamics of Globalization,* (New Haven and London: Yale University Press, 2008), 21.

(See Figure 2). [115] The researcher David Singh Grewal describes the theory as "the concept of network power joins two ideas: first, that standards are more valuable when greater numbers use them because they offer a form of combination; and second, that one effect of this coordination is to eliminate alternative standards that might have been freely chosen." [116] A dominant standard can edge out rivals that are unable to adapt. This process reinforces a positive feedback dynamic that can prove self-reinforcing, and the value of a standard increase with each use of it. For these reasons, the information theory of standards is an important element of strategic communication.
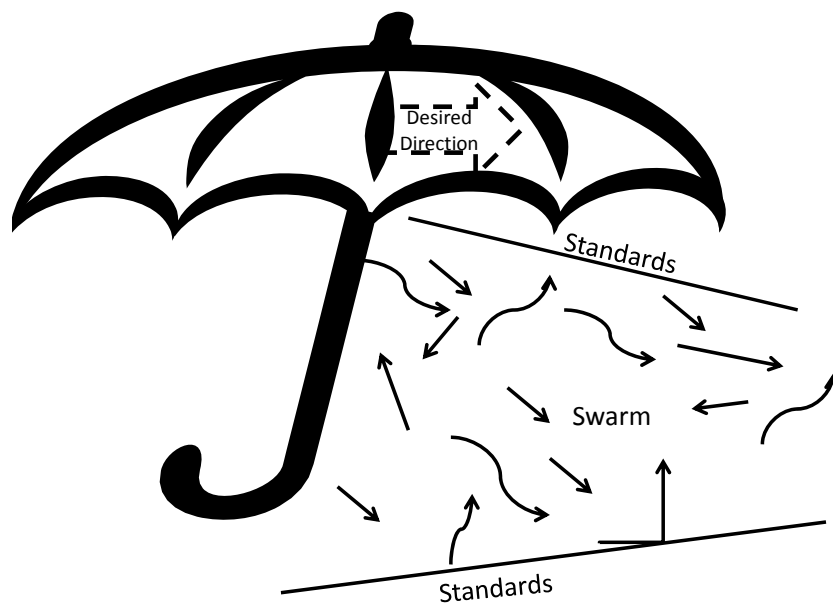

Figure 2: Pragmatic complexity as information theory. The umbrella strategy sets a desired direction bound by standards. Information flows are decentralized as a swarm from different directions towards a common goal.

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[115] A standard defines the particular way in which a group of people is interconnected within a network. It is the shared norm that enables network members to gain access to one another, facilitating their cooperation. A standard must be shared among members of the network to a sufficient degree that they can achieve forms of reciprocity, exchange, or collective effort. David Singh Greval, *Network Power: The Social Dynamics of Globalization*,(New Haven and London: Yale University Press, 2008), 285.

[116] Standards have a power that grows in proportion to the size of the network at the time. David Singh Greval, *Network Power: The Social Dynamics of Globalization*, (New Haven and London: Yale University Press, 2008), 26.

The de-emphasis of the deliberate information strategy and the focus on emergent information

strategy in the theory of pragmatic complexity need improvement.[117] The business strategist

Henry Mintzberg's concept of umbrella strategies is appropriate in this framework, where the

broad outlines of the strategy are deliberate in which the components are allowed to emerge.[118]

Pragmatic complexity can also be understood and improved by using the artificial intelligence

theory of "swarm intelligence".[119] This refers to the combined intelligence of a system, not

explicitly to the sum of intelligence of the components. The system as a whole learns by contact

with and adaption to the changing environment.[120] As a result, it causes a non-linear, decentralized

behavior of a group of agents which learn through their actions and improve their actions

together.[121] The group of agents needs the umbrella strategy to be able to induce simultaneous

actions, independent of each other, towards a common goal without central coordination. In this

way, the agents can blog, conduct information operations, write articles, and participate in

interviews independent of each other; all actions conducted within the current globalized situation

and with the same overarching strategy. This requires the same or a similar set of standards to be

able to communicate; and more importantly, to understand the communication. Swarm theory, in

combination with the umbrella strategy, makes the communication model of pragmatic

complexity useful and may create results larger than the sum of the components.[122] Indeed, the

concept may work in social constructs beyond networks where no fixed social structures exist and

the relationships may be based on common purpose, as well as where the actions are swarming

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[117] Henry Mintzberg, *The Rise and Fall of Strategic Planning,* (New York: The Free Press, 1994), 24.

[118] Ibid, 25.

[119] Eyal Weizman, "Walking through walls: Soldiers as Architects in the Israeli-Palestinian conflict", *Radical Philosophy,* (March/April 2005), 12.

[120] Ibid, 12

[121] An agent is an actor in a system with an independent will and purpose.

[122] Steven R. Corman, Angela Threataway and Bud Goodall, A 21st Century Model in the Global War of Ideas, Consortium for Strategic Communication, Arizona State University (2007)

without central control. The concept as shown in Figure 3 is one way to demonstrate one small part of information as a flow or as energy. Strategic communication is relevant to how forces maneuver successfully in the Information Environment where the center of gravity concept is used today.

The contemporary use of the COG concept

Even as early as 1997, the United States Air Force Major Margaret Schalch, in her article *Planning for Peace Operations: The Relevancy of Center of Gravity* explained that "More attention should be given within the academic and military communities to the CoG concept and its practical application in a range of traditional and non-traditional scenarios."[123] The center of gravity concept suffers greatly from lack of common understanding. The confusion results, not from the inability to understand the usefulness of the concept, but rather from the fact that there are multiple, more or less valid concepts in existence. We can now see that the center of gravity analysis is a fundamental analytical and cognitive tool for planners in contemporary operational planning. Therefore, Joint and Service doctrine need a less ambiguous method to define centers of gravity and describe their use in the full spectrum of military operations. Uncertainty and ambiguity about the use of the CoG concept will continue, without a common framework or common understanding among scholars and military personnel. We can still see the results of the lack of institutional and academic understanding of the center of gravity concept today. Scholars and military officers debate, interpret, and change the concept to fit into their specific type or understanding of the current conflict or situation.

Colonel Dale Eikmeier (Retired), the former United States Army War College faculty member and assistant professor at the United States Army Command and General Staff College

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[123] Margaret E. Schalch, *Planning for Peace Operations: The Relevancy of Center of Gravity,* Global Security.org. http://www.globalsecurity.org/military/library/report/1997/Schalch.htm (Accessed 19 November 2008)

offer an understandable and structured method of CoG analysis. [124] This method is used at the

United States Command and General Staff School by students and faculty to make the process

more understandable and the concept concrete. Eikmeier's model links Arthur F. Lykke's

strategic framework of *ends, ways*, and *means* with the CoG analysis. The resulting CoG is

validated if the center of gravity does the action (through its capabilities) and uses resources

(requirements) to accomplish the action.[125] This method is comprehendible, but assumes one

enemy and one friendly force that do not change. In fact, Eikmeier also assumes a predetermined

way of how an insurgency is conducted and the results are a physical force oriented center of

gravity.[126]

Indeed, modern armies have adapted to the contemporary environment by changing the

basic tenets of the center of gravity concept. Peter Mansoor and Mark Ulrich from the United

States Army wrote a widely acclaimed article in *Military Review* about a new counterinsurgency

(COIN) center of gravity analysis that is being taught to units prior to their deployment.[127] This

COIN center of gravity analysis identifies root causes to the insurgency and then analyzes the

ends, ways, and means of the insurgency. Immediately following, the COIN center of gravities,

which usually are aspects of the population and the insurgent organizations, are identified for the

different actors in the insurgency.[128] The method is a technique of operationalizing the doctrine,

and the results are strategies to counter enemy actions. Consequently, there are potentially

numerous centers of gravity in a COIN environment.

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[124] Dale C. Eikmeier, "Ends, Ways, Means: A logical Method for Center of Gravity Analysis" *Military Review* (Sept/Oct 2007), 62.

[125] Ibid, 64.

[126] Ibid, 65-66.

[127] Peter R. Mansoor and Mark S. Ulrich, "Linking Doctrine to Action: A New Center-Of-Gravity Analysis", *Military Review* (Sept/Oct 2007), 45.

[128] Ibid, 48-49.

Additionally, Major Richard K. Sele, United States Army, proposed in *Military Review* that military environments will require doctrine to recognize the existence of civil centers of gravity through the spectrum of operations.[129] He rightfully stated that the civil dimension is a principle planning factor in full-spectrum operations. However, he suggests integrating civil CoGs into planning to focus mission execution and promote seamless transitions along the spectrum of conflict. This integration indicates that civil CoGs based on population, social constructs, and political leaders etc., parallel with the identified operational CoGs for the insurgency. The use of several centers of gravity may in part be the result of the complexities in "wars among the people" where there are several different sides.[130] This concept also implies a discernable disconnection among the forces in play: between the people, adversaries, and government functions. Moreover, there should not be several different centers of gravity if they are connected according to theory, but rather one on the operational and one on the strategic level of war for each side. However, there may be different centers of gravity on the tactical level according to doctrine, and those CoGs can be separate from each other.[131]

There is also the current practical and theoretical notion of a shift in the enemy CoG.[132] For example, from a conventional force oriented operational CoG that is affected, destroyed, or neutralized. The absence of a military center of gravity may lead to a change to a new civil society oriented center of gravity, or even to the requirement to reconstruct or stabilize a CoG in

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[129] Richard K. Sele, "Engaging Civil Centers of Gravity and Vulnerabilities", *Military Review* (Sept/Oct 2004), 32.

[130] There can be several different armed fractions: the host nation forces, coalition COIN forces, militias, different insurgent organizations, as well as different social structures like clans, tribes, ethnical groups, organizations, political parties, and also the population of surrounding countries and the coalition countries. Rupert Smith, *The Utility of Force,* (New York: Alfred A. Knopf, 2005), 6.

[131] Joint Chiefs of Staff, *Joint Publication 5-0 Joint Operation Planning*, (26 December 2006), IV-11

[132] Rudolph M. Janiczek, *A concept at the crossroads: Rethinking the Center of Gravity*, Strategic Studies Institute, U.S. Army War College, (October 2007). http://www.strategicstudiesinstitute.army.mil/pdffiles/pub805.pdf (accessed September 15, 2008)

order to reintroduce stability to a system. Furthermore, the conventional force oriented CoG may

also shift between phases or in accordance with the development of the situation. For instance,

the switch from an air- or maritime-centric phase into a ground offensive, or the change in an

opponent's condition as morale, logistics, or force generation may change the center of gravity.

Also, a change in one CoG may affect other centers of gravity.[133] The changes in an enemy CoG

affect the friendly center of gravity, due to the interdependence of the opponents in their struggle.

As a result, this implies that the staffs have an implicit responsibility to track and evaluate the

status of the center of gravity, to detect the shift, or to determine the need for reconstruction.[134]

Schneider writes that the CoG is our medium of action and our medium of expression, to counter

a resisting opposing enemy.[135] Still the most common theoretical understanding of the CoG

concept is the enemy CoG that prevents friendly forces from accomplishing their objectives and

the friendly CoG that allows friendly forces to achieve their objectives.[136] Indeed, the concept of

center of gravity has rested in the physical domain of warfare, and the current theoretical

discussion is about including the moral and cognitive domains as well. For these reasons,

theoretically the concept is overly ambiguous and has so many meanings that it becomes deeply

flawed. On the other hand, the concept is used daily by the United States military in current

operations and is providing some utility.

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[133] The change in a the strategic CoG will affect centers of gravity on the other levels of war, a change in a tactical center of gravity may affect the operational or strategic centers of gravity to a lesser extent.

[134] Rudolph M. Janiczek, *A concept at the crossroads: Rethinking the Center of Gravity*, Strategic Studies Institute, U.S. Army War College, (October 2007). http://www.strategicstudiesinstitute.army.mil/pdffiles/pub805.pdf (accessed September 15, 2008)

[135] James J. Schneider, "Agents of Change: Transforming the Principles of War for the 21st Century", *Army,* (July 2006), 32

[136], Antulio J. Echevarria II "Clausewitz' Center of Gravity: It's not what we thought", *Naval War College Review* vol LVI, No 1 ((Winter 2003), 109.

The Survey

The operating forces survey explored the practical use of the center of gravity concept during planning and execution in current doctrine (see the Appendix 1 for details) during November 2008. The empirical data was collected from a population consisting of lieutenant colonels and colonels from the Pre-Command Course, as well as from the Advanced Operational Arts Studies Fellowship at SAMS. The respondents mainly commanded battalions and two thirds previously served on division or joint staffs. Surprisingly, only half the population had used the center of gravity concept. The reasons for not using the CoG concept varied. Some served in particular units, such as logistic and engineer units, where the concept was not applicable. Others did not find the concept applicable to their level of operations at division level and below. One officer, for example, gave the complex nature of the Iraq Theater as the reason for not using the center of gravity concept.

The officers that used the concept identified both physical entities such as the people, fuel, or cell phone communication hubs, as well as non-physical entities as the designated center of gravity. All the officers included the information environment in their center of gravity analysis, mainly through information operations and assessment. Furthermore, the survey showed that most of the officers answering the survey found the center of gravity concept useful and agreed that it may change over time, whether they had used it or not. Half of the population disagreed and half agreed with the existence of several centers of gravity existing at the same level of war.
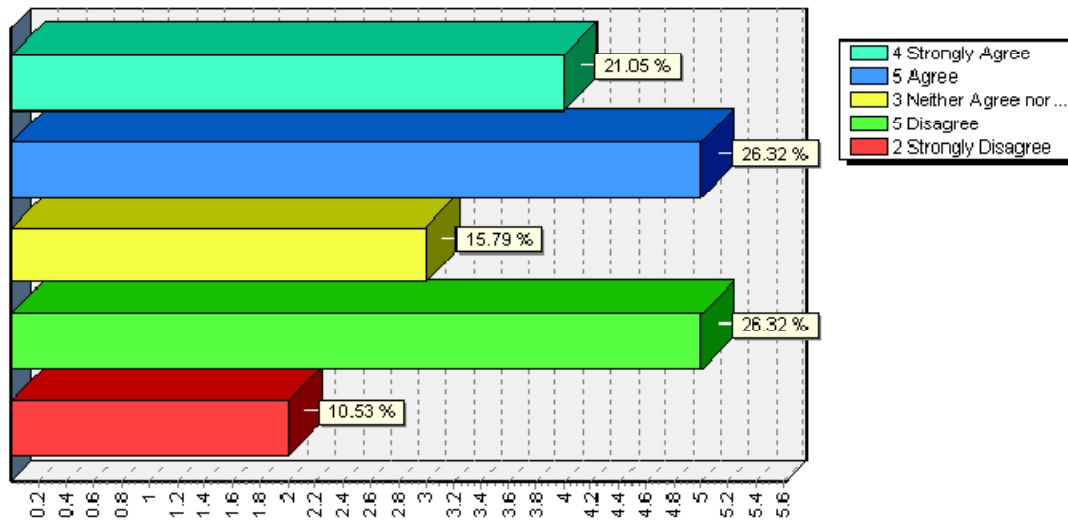
Figure 3: Can there be several centers of gravity on the same level of war?

Although the population surveyed was limited, the results may demonstrate the

perception of usefulness for the concept in operational art described in the contemporary

doctrine.[137] The results also show the ambiguity in understanding the CoG analysis in the realm

of operations art (See Figure 3). To be certain, further research on the contemporary use of

elements of operational design based on statistical data is required. Even though the center of

gravity concept is an important part of operational design, it is ambiguous and misinterpreted, and

the concept risks reducing the situation to a force oriented two dimensional problem.

Section IV: Center of Gravity: A possible Revision

The scope of the center of gravity concept needs to be comprehensive enough that it

allows for the complexity of the information environment while providing focus of effort in a

consistent way. The concept of center of gravity needs to consider all domains of warfare in order

to be useful in the contemporary environment. This is not an attempt to provide a new definition

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[137] The survey does not provide statistically proofed evidence because of the limited population.

or template for the elements of operational design, but merely expands upon the center of gravity concept to make it more adaptive to current and future conditions.

The actual hub or central entity that gives power, purpose, and direction to the structure or system may be transitional and evolving. The soundness of the concept is created by the interface between the belligerents and their transformation as they alter their relationship. Consequently, it is important to identify the centripetal force that holds the structure together.[138] Furthermore, in a structure where all parts are interlinked with each other, as in a *clique* or full matrix structure, the hub or center part may be very difficult to find.[139] On the other hand, there may be situations where a linear mechanistic physical force oriented approach can be appropriate. There may still be occasions when there is a central part, as a military or security unit, as the center of gravity. The military unit may be the source of power that projects the centrifugal force so as to create a capability or action. The centrifugal force is the dominant force in the case of a physical entity as a military or security unit, as opposed to the centripetal force dominating in an ambiguous situation. The source of power depends upon the composition, interdependence, and adaptivity of the adversary and friendly forces involved. Indeed, another approach is required in an environment characterized by ambiguous human networks interacting with each other: forming complex adaptive systems that struggle with each other.[140] Exact focused definitions of a perceived point, which seems to be the most influential and relevant factor at the time, may prove to be nonexistent or unimportant at another time or in other conditions. In the context of Rupert Smith's idea about media, combined with the Toffler's notion of knowledge as the central

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[138] The central hub does not need to be the most powerful part in a structure. David Singh Greval, *Network Power: The Social Dynamics of Globalization,* New Haven and London: Yale University Press, 2008, 183.

[139] The full matrix or clique is a system and network where all components and agents are related to everyone else.

[140] This is the case in many conflicts, insurgencies and stability operations. Axelrod, Robert and Cohen, Michael D. *Harnessing Complexity: Organizational Implications of a Scientific Frontier*, (New York: Basic Books, 2000), 7-8.

resource of destructivity the force, source, or resource that holds the concept of center of gravity together is information or knowledge.[141] The element that may connect a decentralized, interdependent, and by nature disconnected enemy, adversary or friendly structure, is the information element (See Figure 4) based on the dominant standard of information sharing. Consequently, the information environment needs to be included in the center of gravity concept for ambiguous scenarios in conflicts and wars among the people.
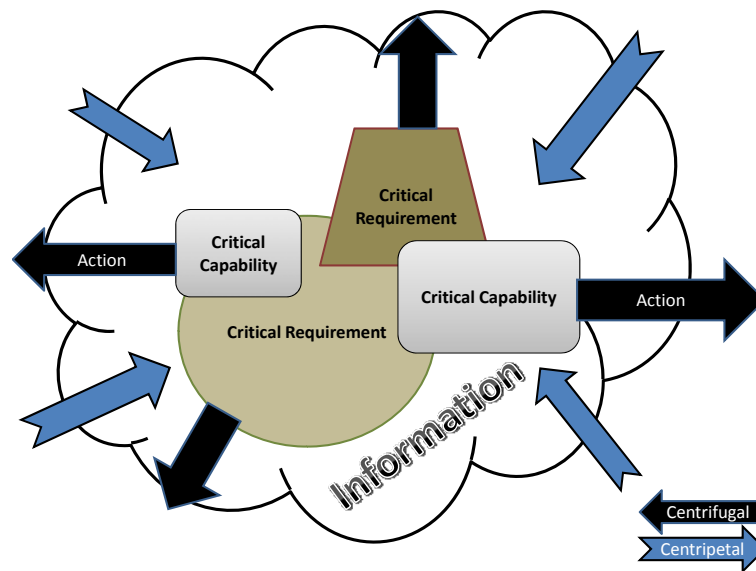
Figure 4: The centripetal force is information, which holds the various parts in a structure or entity together. The figure also shows the interdependence between centripetal and centrifugal forces to create a CoG.

Figure 4 shows the center of gravity for one actor as a construct of critical factors which consists of critical capabilities. Critical capabilities are enablers, physical and cognitive actions of the CoG. Critical requirements are conditions, resources, and means for the CoG and its capabilities.[142] The capability is part of the centrifugal force that can be used against the opposing critical factors, all held together by the centripetal forces of information.

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[141] Toffler, Alvin and Heidi, *War and Anti-War,* (New York: Little, Brown and Company, 1993), 71.

[142] Joint Chiefs of Staff, Joint Publication 5-0 *Joint Operation Planning*, (26 December 2006), IV-11.

The theory of pragmatic complexity becomes useful, as information theory, when combined with the umbrella strategy, swarm theory, and standards of network power. These theories provide the foundation that creates the informational context that forces maneuver within and may provide the centripetal force that holds entities together. The information context requires similar standards to be able to communicate; and more importantly, requires similar standards to understand the communication. The umbrella strategy is needed to induce simultaneous independent action, towards a common goal without central control or synchronization. The swarm theory, in combination with the umbrella strategy, makes the communication model of pragmatic complexity useful and may create results larger than the sum of the components.[143] The decentralized interconnected flow of information in a globalized world provides the patterns of meaning that the centripetal force is built upon.

Design suggests that entire entities or structures are included in the center of gravity concept, according to its inherent holistic approach.[144] The holistic approach counteracts the risk of reductionism, linear causality, and avoids the center of gravity as a "snapshot in time." In addition, the holistic approach is further reinforced by the idea of energy or a force that acts upon all the points in an object simultaneously.[145] In fact, the center of gravity represents the point of convergence where centripetal forces come together instead of only the point from where the forces flow outward. Furthermore, when a complex object changes the distribution of its structure, its physical position, or if external structures are added or subtracted, the CoG requires

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[143] Steven R. Corman, Angela Thretaway and Bud Goodall, A 21st Century Model in the Global War of Ideas, Consortium for Strategic Communication, Arizona State University (2007)

[144] TRADOC Pamphlet 525-5-500 *Commander's Appreciation and Campaign Design* Version 1.0, United States Army training and Doctrine Command, Fort Monroe (January 2008), 28.

[145] Antulio J. Echevarria II "Clausewitz' Center of Gravity: It's not what we thought", *Naval War College Review* vol LVI, No 1 ((Winter 2003), 109.

reevaluation.[146] Consequently, the center of gravity needs to include larger structures, if not the entire systems, to avoid reductionism. The holistic approach to the CoG counteracts the conventional wisdom of focusing the entire effort against a single decisive point, which is tempting to use when utilizing military force. Also, including larger structures into the CoG may theoretically reduce some of the temptation to use linear causality models. Then again, this may include Eikmeier's specific ideas on a CoG as a physical economic, military, security entity which *does* something tangible.[147] However, the concept cannot be as specific as Eikmeier suggests since that will result in a template which is undesirable in the creative domain of operational art.

Hence, the CoG can be viewed as constructed by the interaction of centrifugal and centripetal forces.[148] The centripetal force such as information, may well dominate in ambiguous situations with several actors. Also, the inclusion of larger entities may enable the center of gravity concept to be useful in complex situations, without several related minor centers of gravity. The complex structures that operate on the principle of synergy and on the reliability and smoothness of the interaction among its various components can still be analyzed by Strange's doctrinal center of gravity analysis.[149] They can still be affected through their fragile components where the loss of important components unbalances the entire structure.[150] The indirect approach

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[146] Antulio J Echevarria II,. *Clausewitz' Center of Gravity: Changing our warfighting doctrine – again!,* Strategic Studies Institute, U.S. Army War College, (2002 September). http://www.strategicstudiesinstitute.army.mil/ (accessed September 15, 2008)

[147] Eikmeier, Dale C, "Center of Gravity Analysis", *Military Review* (July-September 2004), 5.

[148] Figure 4 demonstrates the interaction between forces that hold the system together and the forces that are projected out from the system. They are different in each situation and they evolve when the relationship with other interrelated actors or opponents change. The dominance of a centrifugal force in a conventional fight may diminish when the opponent are defeated or turn to guerilla warfare. Then the centrifugal force as information may dominate, but there is not one time of only one type of force.

[149] Joint Chiefs of Staff, Joint Publication 5-0 *Joint Operation Planning*, (26 December 2006), IV-10.

[150] TRADOC Pamphlet 525-5-500 Commander's Appreciation and Campaign Design Version 1.0, United States Army Training and Doctrine Command, Fort Monroe (January 2008)

may still produce an increasing decline in cohesion and efficiency which may result in malfunction, and which will invariably leave the structures vulnerable to further damage. With these modifications to the perspective on the center of gravity concept, it retains its value in operational art.

Section V: CONCLUSIONS

The center of gravity concept is theoretically flawed and currently inappropriate for employment within operational art and requires modification to fit into today's complex environment. However, the center of gravity concept is deeply ingrained in current doctrine, and it is by many considered the foremost element of operational design. There is a wide variety of interpretations and definitions of the concept of center of gravity among scholars and practitioners. This ambiguity is reflected in the various practical applications of the concept and the ongoing debate in various military journals. The present day center of gravity concept is still a useful tool to have in the planner's toolbox for those situations where a clearly defined 'complicated' adversary or enemy exists. Thus, it does not have to apply in all cases, because the concept tends to have the disadvantage of reflecting linear thinking in terms of massing combat forces against a single point and linear causal relationships. It may still be a suitable approach for many types of conflicts with a clear structured conventional force adversary. Also, the overall concept should not be abandoned due to the lack of common understanding or its inherent inability to be used in every imaginable situation. The practical value of the CoG concept in operational art is to focus effort against identified adversary and friendly vulnerabilities, whether they are a single point or numerous points through an indirect approach to attach the entire system

or network with simultaneity and depth. There is also a considerable value in the concept as a purely theoretical approach to the construct or model of oneself in relationship to the enemy.

The relationship between the belligerents is an important factor in the concept because the opponents are connected during their struggle (See Figure 1). Relationships also apply to the construct of the CoG where the various parts need to be interdependent to be part of the same center of gravity. The center of gravity may be the centripetal force that holds an adversary together instead of the center of mass or the most dangerous enemy formation. That condition of the centripetal force may mitigate the fact that it will be a slice of reality during a snapshot in time, which the staff needs to manage. However, there is the risk of using the concept in a situation without a clearly identifiable CoG or against an enemy in a complex adaptive system where no specific center of gravity exists over time and space. Furthermore, there is also a risk that the patterns of causality are unpredictable and can act counter to intentions. Moreover, as the struggle between two or several opponents shifts, so does the centers of gravity for the opponents. The misinterpretation of a shifting CoG may result in the waste of effort on the wrong aspect of an adversary. Also, the constant assessment of the CoGs presents commanders and staff officers with unnecessary challenges during all phases of a campaign or major operation.

Aspects of information theory need to be included in the center of gravity concept and the concept must to be adjusted according to the characteristics of the situation, to develop current thinking on the center of gravity concept. Subjective variables attributed to a CoG analysis, such as information, ideas, and principles, may be the centripetal force that provides direction to distributed and interconnected societies. The concept also needs to consider all three domains of warfare to be relevant and to avoid a physical reductionist result. There may even be occasions where the center of gravity concept is not applicable due to aspects of complexity, change, and the existence of several different actors. Accordingly, theories as the umbrella strategy is needed to be able to induce simultaneous actions by multiple connected actors, independent of each other, towards a common goal without central coordination. The swarm theory, in combination

with the umbrella strategy, makes the communication model of pragmatic complexity useful and ensures an understanding of information flows and strategic communication. This means that the actor or system will set an overarching guiding strategy with a distinct purpose; this also suggests that this actor or system will influence the important prevalent standards in the information environment. The actor then promotes decentralized execution from multiple angles and sources to overwhelm opponents and retains the convinced and influences the undecided. Strategic communication is relevant to how forces maneuver successfully in the moral and cognitive domain, as the information environment where the center of gravity concept is often used today. The decentralized flow of information as energy is intelligible when it is used as the centripetal force that holds the CoG together.

Commanders and staff members think creatively and apply tools and concepts that are appropriate for the specific situation and the undertaking at hand. The center of gravity concept can be used, according to current doctrine, to focus effort against a specific point in an enemy structure. These conditions may risk being a self fulfilling prophecy, which result in the search for a concrete one dimensional center of gravity. Alternatively, the risk is that a reductionist, mechanistic, and purely physical military approach may be the result of this focused process. Thus, it may be beneficial to identify the entire structure or a large part of it as the CoG in a changing ambiguous situation with several actors, adversaries, and enemies. As a consequence, there are no singular actions that can change the center of gravity through a causal chain, but multiple actions through different leverage points in the structure. The CoG concept thereby enables planners and commanders to set the conditions for a wider effort upon critical capabilities and requirements in a complex situation. The CoG analysis should provide leverage points through which adversary systems can be affected and friendly systems strengthened. The holistic approach to center of gravity fits well within Design, which considers changes and different interrelationships across the spectrum, and as a result creates a pattern with a purpose as opposed to fixed structures.

In conclusion, commanders and their staffs need to identify where the connections and gaps exist in the system as a whole, before they decide whether a center of gravity exists. The center of gravity exists in relationship with other centers of gravity, and the concept may need to include larger structures and systems to avoid reductionism. The CoG can be viewed as constructed by the interaction of centrifugal and centripetal forces which dissimilar strength according to the situation. The information environment should always be considered in this process, and information should be assessed as the centripetal force in a center of gravity construct. Education and doctrine will also continue to assist the commander and staff during the orienting phase, enable the commander or staff officer to be adaptive to the situation, and help avoid set templates.

Recommendations

The theoretical construct of the doctrinal center of gravity should be illustrated as the interaction between centripetal and centrifugal forces, which have different strength in diverse situations. Doctrine should also describe the interaction between the moral, cognitive and physical domain to provide a holistic approach to the center of gravity concept. Education and doctrine is vital to provide a thorough understanding of the theoretical concepts as a foundation to enable the practitioner to use the center of gravity concept. Staff and war colleges should put effort on the theoretical background to the elements of operational design in all spectrums of operations before teaching current doctrine in order to avoid reductionist thinking and templates. Finally, further research on the contemporary use of elements of operational design based on surveys and statistical analysis is recommended to develop United States doctrine. The population should consist of brigade commanders and higher, faculty at staff and war colleges, as well as staff officers from division staff up to and including joint staffs in the United States military.

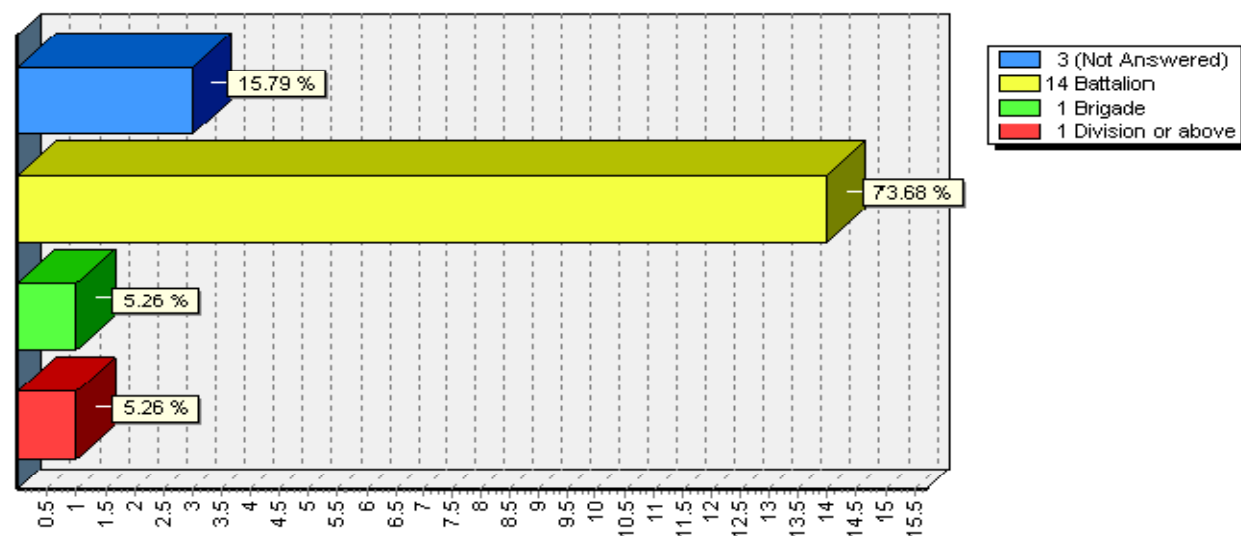# Appendix 1: The survey on the contemporary use of the center of gravity concept.

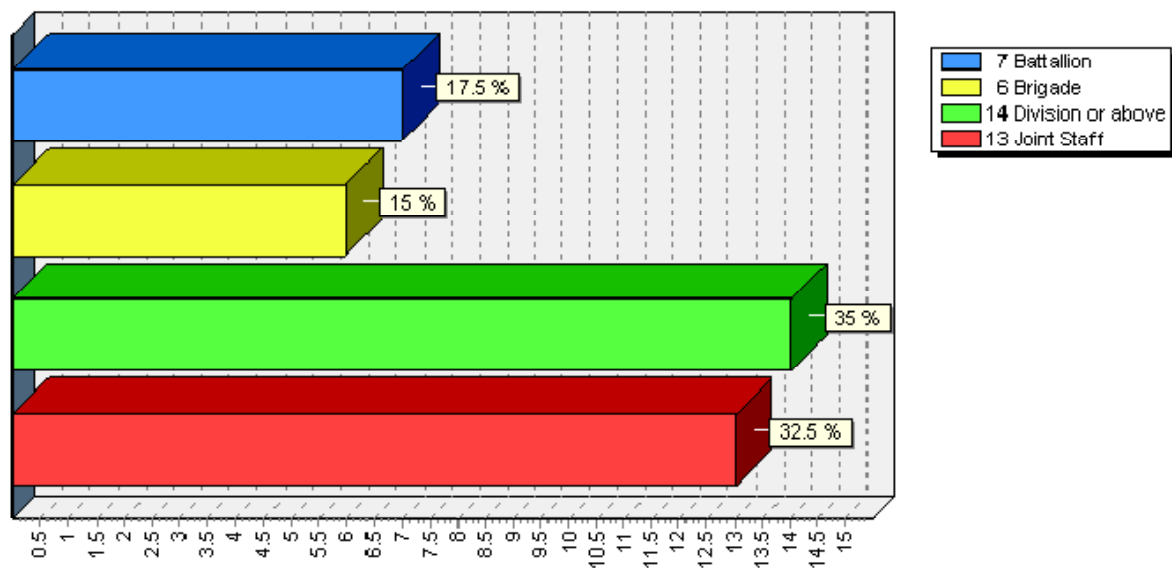**Figure 5: What is your command level experience?**

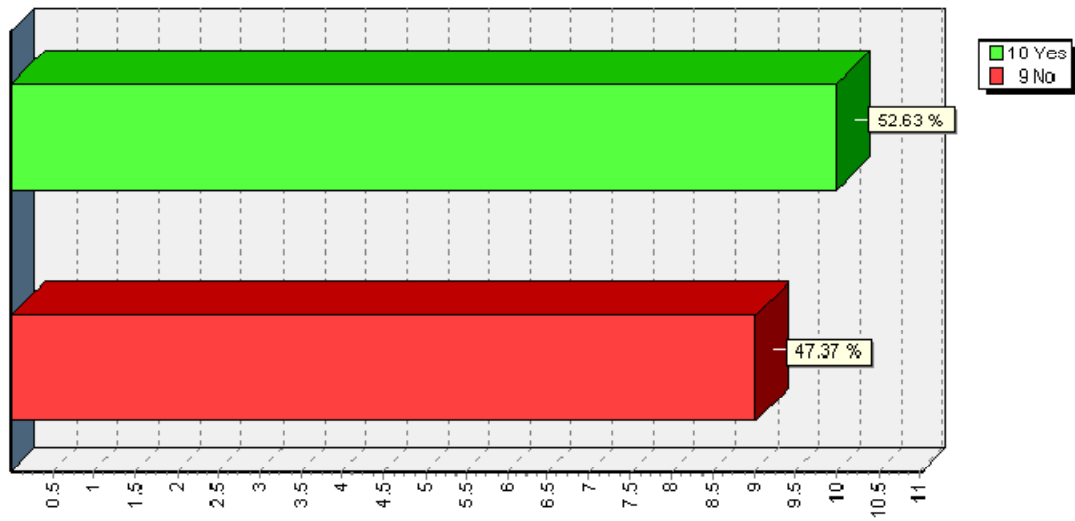**Figure 6: What is your staff level experience?**

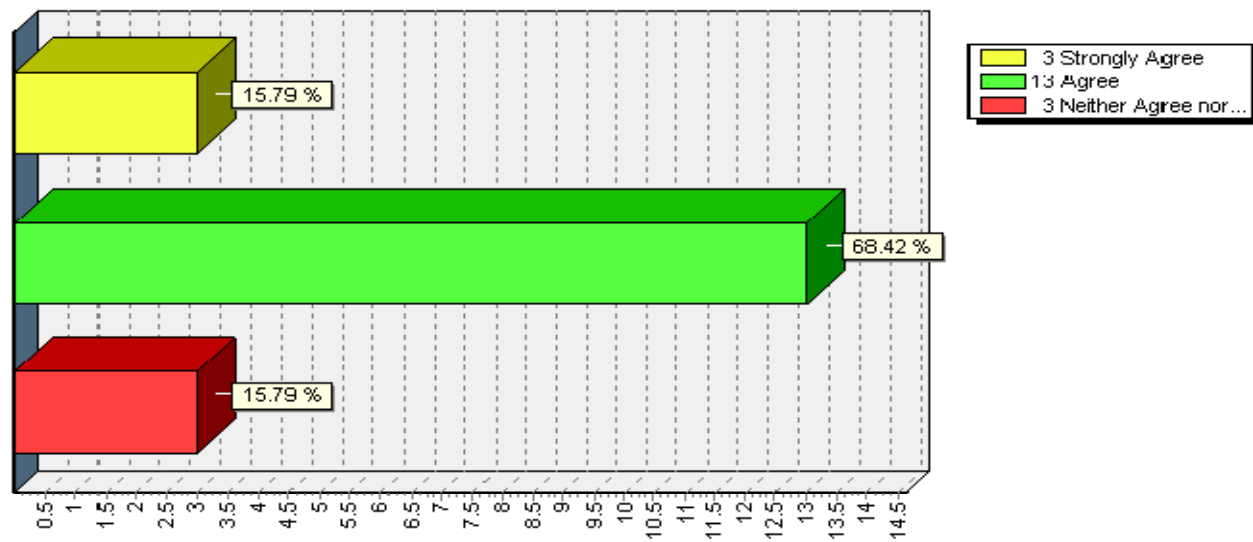**Figure 7: As a commander or a staff officer: Did you use a center of gravity concept?**

Figure 8: Mark the most appropriate option. The center of gravity concept is a useful tool during operational planning.
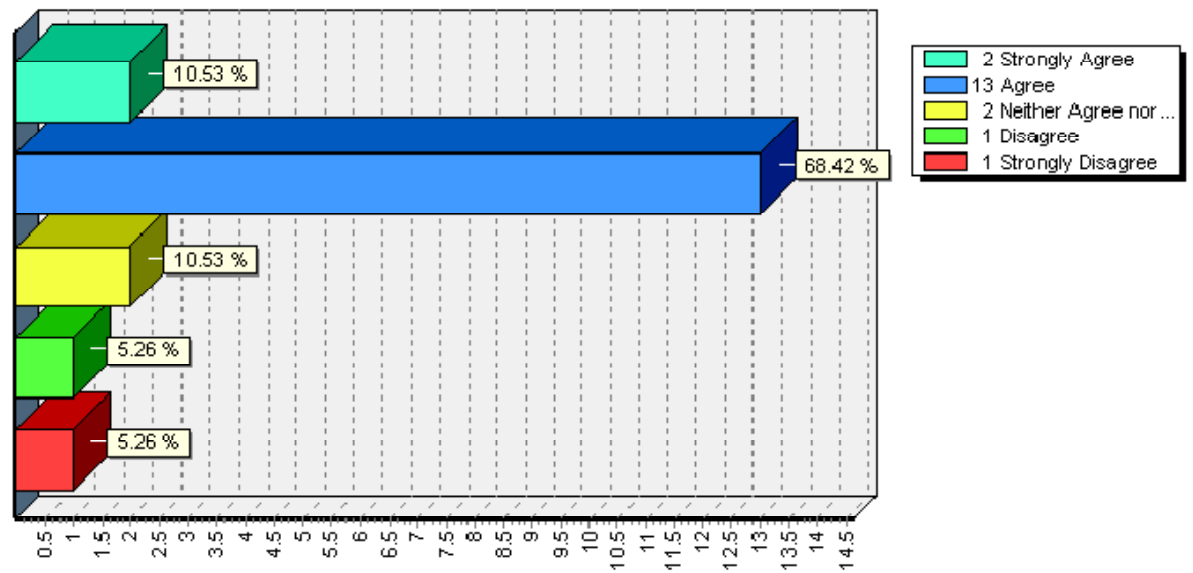
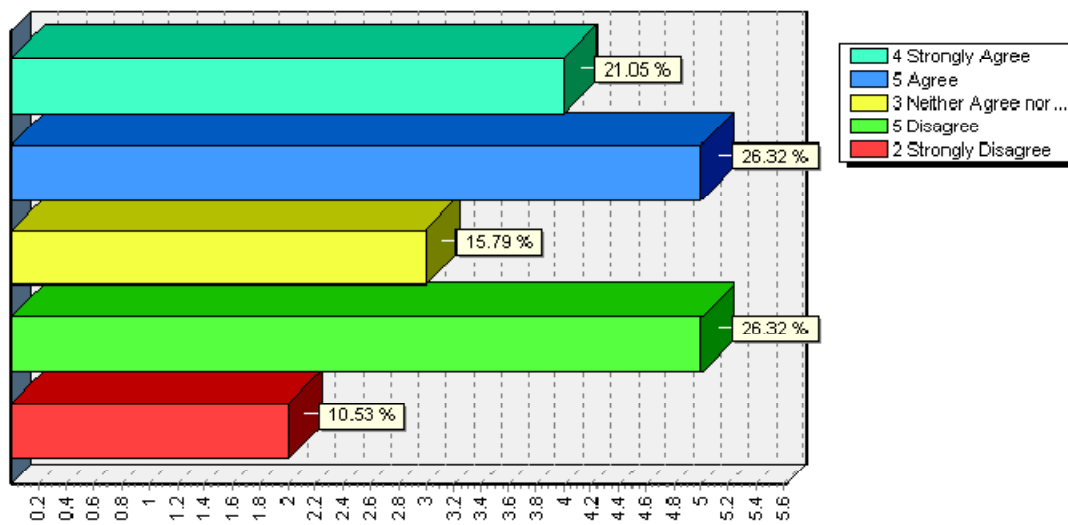**Figure 9: The center of gravity concept is useful during execution.**

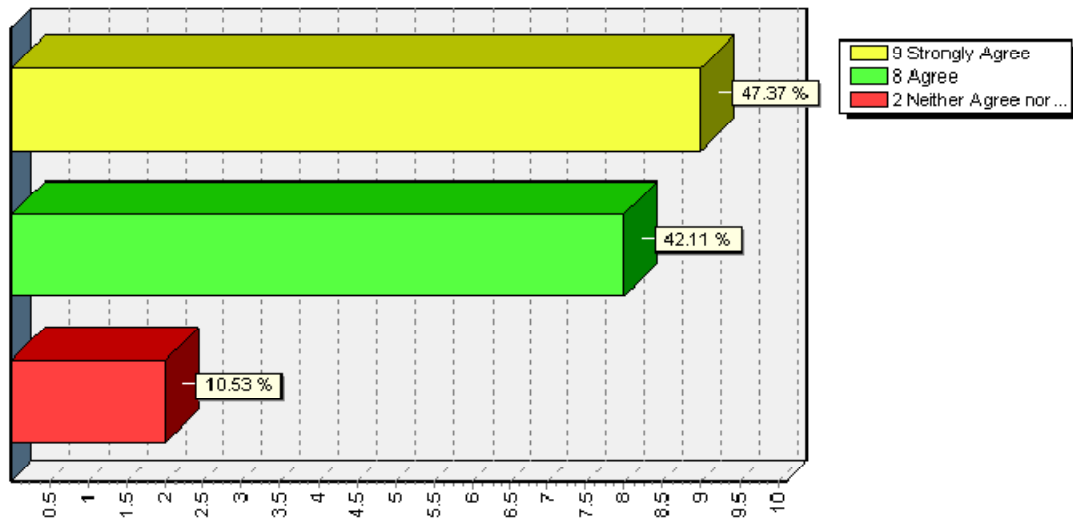**Figure 10: There can be several centers of gravity at the same level?**

Figure 11: The center of gravity can change over time.

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